SF 298 MASTER COPY KEEP THIS COPY FOR REPRODUCTION PURPOSES

REPORT DOCUMENTATION PAGE

Form Approved OMB NO. 0704-0188

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	Jan 31, 1996	Final 1 Jun 94 - 31 May 96

4. TITLE AND SUBTITLE

Language and Logic:
Research in the Formalization of Discourse

5. FUNDING NUMBERS

DAAH04-94-G-0238

6. AUTHOR(S)

Donald Perlis and Elizabeth Perlis

7. PERFORMING ORGANIZATION NAMES(S) AND ADDRESS(ES)

University of Maryland
College Park, MD 20742

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

U.S. Army Research Office
P.O. Box 12211
Research Triangle Park, NC 27709-2211

10. SPONSORING / MONITORING AGENCY REPORT NUMBER

ARO 33423.6-MA

11. SUPPLEMENTARY NOTES

The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other documentation.

12a. DISTRIBUTION / AVAILABILITY STATEMENT

Approved for public release; distribution unlimited.

12 b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

This project analyzed some of the pragmatic reasoning which underlies the understanding of simple natural language discourses. One characteristic of such reasoning is its nonmonotonicity; what follows from an isolated piece of a text does not necessarily follow from the text taken as a whole. Several linguistic constructions were identified which are important for the intended computational applications, and which produce these nonmonotonic effects in interpretation. An outline was given for an account of the conclusions about what is being conveyed which it is reasonable for a language interpreter to draw, at different points in a communication; this was then further elaborated and implemented. We also analyzed change of mind in the light of contradictory information.

14. SUBJECT TERMS	15. NUMBER IF PAGES
pragmatics, dialog, nonmonotonicity	5
	16. PRICE CODE

17. SECURITY CLASSIFICATION OR REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UL

LANGUAGE AND LOGIC: RESEARCH IN THE FORMALIZATION OF DISCOURSE

FINAL PROGRESS REPORT

DONALD PERLIS and ELIZABETH KLIPPLE

JANUARY 31, 1996

U.S. ARMY RESEARCH OFFICE

GRANT NUMBER DAAH04-94-G-0238

UNIVERSITY OF MARYLAND AT COLLEGE PARK

LANGUAGE AND LOGIC: RESEARCH IN THE FORMALIZATION OF DISCOURSE

FINAL PROGRESS REPORT

DONALD PERLIS and ELIZABETH KLIPPLE

JANUARY 31, 1996

U.S. ARMY RESEARCH OFFICE

GRANT NUMBER DAAH04-94-G-0238

UNIVERSITY OF MARYLAND AT COLLEGE PARK

STATEMENT OF THE PROBLEM STUDIED

In this one-year project, we have studied various interrelated aspects of language and logic, including novice-expert dialog, formalization of presuppositional reasoning in dialog, error-revision, and situated reasoning. These are among the chief areas we had planned to work on. Below we summarize the progress we have made, and provide citations to the papers based on this work; copies of these papers are being sent separately. Some of this work was performed in collaboration with scientific personnel (specifically, Dr. John Gurney) at the Army Research Laboratory, Adelphi, Md.

SUMMARY OF THE MOST IMPORTANT RESULTS

Novice-expert dialog. We utilized previous ARO-supported work in active (step) logics to analyze expert-novice dialog, and provide some computational mechanisms allowing individuals of different levels of experience to negotiate an understanding through alterations in their language usage.

Presuppositional reasoning. Ideas from nonmonotonic reasoning were applied to presupposition generation, and in particular to an approach by Heim, which was then generalized to account for more complex cases. As agents exchange information, there is a background of assumptions each makes, without which effective communication is impossible. But often initial assumptions or presuppositions must be withdrawn later as more information becomes available. The determination of which prior presuppositions to withdraw and which to retain had not been explicitly handled before by other researchers; we offer a more general algorithm.

Error revision. We investigated how an agent might come to suspect and detect erroneous beliefs, such as that of coming to suspect an error upon noting competing or incoherent beliefs, and then suspending the use of potentially problematic beliefs and hypothesizing alternative views of the world. We present axioms for such integrated reasoning in time, and apply them to several commonsense problems of identification errors. We also offered some concrete notions as to how conscious attention might play a role in error-recognition and correction.

Conveyed meanings. We analyzed defeasible inferences underlying the interpretation of conversational implicatures and presuppositions, showing that a suitable nonmonotonic consequence notion will lead from premises including pragmatic generalizations to conclusions about how those sentences are best interpreted.

Situated reasoning. We argue that intelligent agents will need far more abilities than current in formal work; in particular the ability to count and to group objects. And that this in turn is facilitated by flexible logics that allow re-grouping over time.

LIST OF ALL PUBLICATIONS AND TECHNICAL REPORTS

- Elgot-Drapkin, J., D. Gordon, S. Kraus, M. Miller, M. Nirkhe, D. Perlis "Calibrating, counting, grounding, grouping", Working Notes of AAAI Symposium on Intelligent Agents, 1994.
- Gurney, J. and M. Morreau,"Presupposition and the concept of a non-monotonic discourse". Second Dutch/German workshop on nonmonotonic reasoning. 1995, Utrecht.
- Gurney, J., D. Perlis and K. Purang, "Active Logic and Heim's rule for updating discourse context." IJCAI 95 Workshop on Context in Natural Language, 1995.
- Miller, M. "Context shifts and clashes in dialogues: an active logic perspective", *Fundamenta Informaticae*, Vol. 23, 1995, pp. 355-370.
- Morreau, M. "How to derive conveyed meanings." In *Proceedings of BIS-FAI 95.* Hebrew University, Jerusalem, Israel.
- Perlis, D. and M. Miller,"Automated Expert Reasoning and Expert-Novice Communication," to appear in Human and Machine Expertise in Context (K. Ford, P. Feltovich, and R. Hoffman, eds). (Formerly titled "What experts deny, novices must understand.")

SCIENTIFIC PERSONNEL SUPPORTED BY THIS PROJECT

Dr. Donald Perlis, Dr. Michael Miller, Dr. Michael Morreau, Mr. Khemdut Purang. Also, Dr. Elizabeth Klipple was supported under an AASERT award (DAAH04-95-10274) associated with this parent grant.